



“ZTZ-SP” Plier Tool Instructions **(ZT04-98-002)**

The following procedure describes the installation of a Zippertubing jacket which has the Z-Track extruded inter-lock closure using the Zippertubing “ZTZ-SP” plier tool. The procedure defines the basic closing procedure and provides several hints and tricks that will make installation easier. Keep in mind that a written procedure alone will not make you an expert. Only repeated experience with varying installation situations will tell you the best way to handle the unexpected. Learning to close Zippertubing’s Z-Track is much like learning to ride a bicycle. Initially you will be wobbly and will probably have the tool fall off the tubing repeatedly. There is a “feel” to using the plier tool, just like there is a balance point that must be learned before riding a bicycle becomes second nature. The key word for success is; practice, practice and more practice.

To correctly learn the “feel” of a properly closed Zippertubing Z-Track jacket, it is suggested that you begin on a practice piece of Zippertubing material. Ideally, this learning piece would be a non-shielded, vinyl material (Types GP, 63 or PVL) approximately two feet in length. Select a work area that has plenty of light and where you can sit down. Proceed to the installation sequence steps listed below.

1) Material & Tooling

Examine the sample piece of Zippertubing jacket material and the plier tool. Figure 1 illustrates the closure mechanism along each edge of the jacket in both the open (as delivered) and closed (installed) conditions. Figure 2 illustrates the plier tool construction and how the tool tip spreads the channel allowing the arrowhead side to be inserted.

2) Installing the Tool (right handed installer)

Hold the end of the jacket in your left hand with the channel extrusion facing up. Hold the tool in your right hand and spread the handles so the jaws open. Insert the top knife-edge tang of the tool tip into the slit of the channel approximately 1/2 to 1.0 inches back from the end of the material. With your fingernail of you left thumb spread the channel just ahead of the tool tip and twist the channel open so that the lower knife-edge tang of the tool enters the channel extrusion. Figure 3.

3) Inserting the Arrow

While continuing to hold the tool in your right hand (jaws are not spread), grasp the end of the arrowhead side of the jacket with your left hand and bring the two jacket edges close together. This will create a tubular shaped jacket near the tool end. The tool should be set back from the jacket end approximately 1/2 to 1.0 inches. Pull the arrowhead end back so that it can be inserted into the tool window opening (Figure 4). The tool will have spread the two halves of the channel extrusion open enough in this area to allow the end of the arrow to enter the channel cavity. Pull the arrow end into the channel and continue until both halves of the Z-Track extrusion are even at the tube end.

Note:

You may find that with some types of shielded Zippertubing the jacket stiffness or just a snug fit of a non-shielded jacket around the cable will not allow the arrow end of the jacket to be pulled back far enough to be easily inserted into the channel. To ease this problem, use a pair of scissors and make a 45-degree cut, approximately 1/2-inch back from the end of the jacket on the arrowhead side (Figure 5). This will allow the end of the arrow to be closer to the tool window while not distorting the jacket material very much. You will discover that this will make inserting the arrow easier.

4) Track Closure

Using your thumb and index finger of your left hand, grasp and pinch the arrow and channel together at the end of the tubing. Twist the tool counterclockwise slightly (about 10 degrees) and begin pulling the tool away from your left hand. As the tool slides along it will pull the arrow into the channel cavity and trap it. See Figure 6.

After you have completed closing a few feet of the jacket, use your free hand and pinch the closed track with your fingers starting at the closed end (i.e. as if you were trying to push the arrowhead side into the channel manually). See Figure 7a. You may periodically hear a slight pop or click sound. These are areas where only the outer catch of the closure caught the top arrow barb. The click is the inner barb snapping into the channel cavity. This partially closed condition can be caused by excessive tool twisting or pulling the tool along the track too quickly. Figures 7b and 7c illustrate a cross section views of the closure with 7b showing the correct closure and 7c depicting a partially closed track with only the top arrow barb caught.

Note:

- a) Do not impart too much counterclockwise twist into the tool as you pull. An excessive amount of twist will cause the track closure to spiral radially around your cable center. This spiral twist has no

negative effect on the Zippertubing jacket but your installation requirements or situation may make the phenomena undesirable? It also results in the ends of the jacket not being even. Another negative to imparting too much twist is that it can contribute to the partially closed track condition described above.

- b) You can ease the tool pull force required by having an assistant pre-shape the Zippertubing jacket material around the cable and into a tubular shape ahead of the area you are closing. If you are working alone, you can loosely install a plastic cable tie around the cable jacket and slide it ahead of you to create the pre-shaped jacket effect. See Figure 10.

5) Finished Jacket

Once the Zippertubing has been completely closed and the tool has slid off the end opposite the starting point you will notice that you now have a round tubular jacket from what once was a flat piece of sheet material. Had the jacket been install around a group of wires and cables you would have a single cable harness that is much easier to route and manage.

Now grasp the closed tubular jacket on either side of the track near the middle of the tube length and try to pull the jacket open. You will find that it takes a significant amount of force to pull the track apart. Vinyl based Z-Track typically requires 30-35 pounds per inch width of force to cause the track to separate. Other materials will vary in strength, but a properly closed Z-Track does not open easily! The easiest place to pull a Zippertubing jacket apart will be near the ends. If your jacket does open easily, then the area you pulled on was probably not closed correctly and had only one barb of the arrowhead properly engaged? Insure that you always go back and squeeze the track together with your fingers. Figure 7a.

If your sample track did not unzip, use your thumbnail and lift the outer catch of the channel side near the tubing end while pulling the arrow barb out and separate the jacket over its entire length. Repeat the zipping and un-zipping procedures until you feel comfortable with the tool and how the Zippertubing closes.

6) The Unexpected

Once you are comfortable with the tool operation, close about half the tube length and then stop. Spread the plier tool handles while rock the tool slightly back and forth and pull the tool off the track. This should leave about half the jacket zipped up and half un-zipped. The condition you see before you will occur on production assemblies for a variety of reasons. There is no need to unzip the entire tubing length to finish re-closing a jacket in this condition. Simply spread the plier tool handles and push the tool back over the area where the track begins to open. Insure that the back of the tool jaws is up against the closed track area. See Figure 8.

Release the plier tool handles. Grasp the plier handle as you normally would, rock the tool back and forth as you pull and the tool will re-engage the track and continue closing it. See Figure 9.

7) Zippertubing Facts, Hints & Tricks:

- a) All jacket diameters must be sized a minimum of +1/8" larger than the maximum cable diameter that is to be covered. The extra clearance is required for two reasons. First, the plier tool requires some room because the inner jaw of the tool is sliding down the inside of the closing tube. Second, all the tubing jacket materials are non-elastic and as a result must wrinkle up on the inside of all bend radii. This wrinkling effectively reduces the amount of material available to go around the circumference of the cable bundle in these bend areas. The +1/8" oversize has been found to be sufficient for bundle diameters up to 3-7/8." For cable bundles of 4.0" and larger, this should be +1/8" to +1/4" oversize. The general rule for Zippertubing is, too big may be undesirable, but too small is scrap!
- b) Some Zippertubing material types cause more tool friction than others and as a result can make the tool hard to pull, especially over long jacket lengths. Pre-shaping the tubing ahead of the tool, as previously described, can help reduce this problem. See Figure 10a and 10b.

Adding a small amount of talcum powder, Isopropyl Alcohol (IPA) or other non-Silicone lubricant to the channel side of the track can also ease the pull force required for closing the track. Keep in mind however, that this lubricating action will also reduce the overall closure strength of the Z-Track joint. Isopropyl Alcohol (IPA) is preferred since it will evaporate quickly providing the desired short term lubrication while not reducing the long term track strength.

Note:

Always test any lubricant not listed above on a small piece of material to insure that it does not degrade the jacket material.

Caution:

The Isopropyl Alcohol (IPA) material is flammable and may or may not be acceptable in your application situation. Verify with your in-house process engineering department that it is acceptable to use prior to making any installations.

- c) The position of the closure track on the harness can have an effect on the degree to which the track wants to remain closed. The most desirable location for the closure track on a cable bundle is on the outside of any bend radius. See Figure 11. Positioning the jacket in

this fashion allows the thin jacket wall to wrinkle easily on the inside of the radius while pulling the arrowhead barbs tight against the channel hooks. Locating the thick track extrusion section on the inside of the radius will make it difficult to close, the cable more difficult to bend and could cause the track channel to distort enough to allow the arrowhead to be released. This can result in the track opening up. See Figure 12.

- d) If the finished cable assembly is not likely to need re-opening and you wish to further seal the closure against the environment or tampering, you can seal the track closed using a strip of Zippertubing's ZT-Tape-8235. This tape is a UL recognized, fire retarded, adhesive backed, Polyurethane film that is typically supplied in 1-inch widths. This process consists of laying a strip of tape over the center of the closure (parallel to the closure line) over the entire length of the jacket. The ZT-Tape is highly elastic and it is important that the tape be laid over the track in a relaxed condition (do not stretch the tape longitudinally). By working the tape down tight against the track you can insure that moisture does not penetrate the mechanical closure and that the track does re-open unexpectedly.

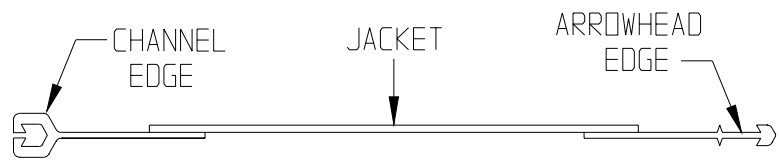
Caution

If the tape is laid down in a stretched condition the tape may dis-bond from the adhesive over time when the cable is left in a coiled condition.

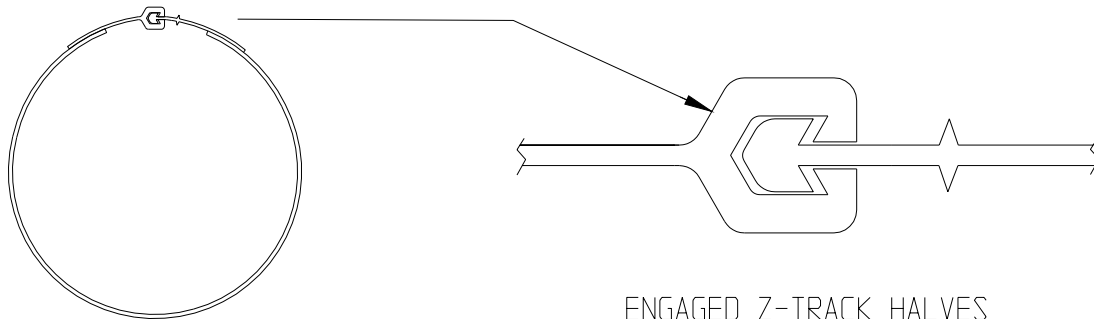
Note

The ZT-Tape-8235 is the only recommended process to seal Zippertubing mechanical track closures. This procedure replaces the old ZTQ Sealer process that was discontinued in the late 1980's. Refer to Zippertubing process procedure document ZT93-98-003.

If you have any questions regarding the use of Zippertubing's Z-Track jackets, the plier tool or any procedure described in this document, please contact the Zippertubing Company Engineering department for additional information.



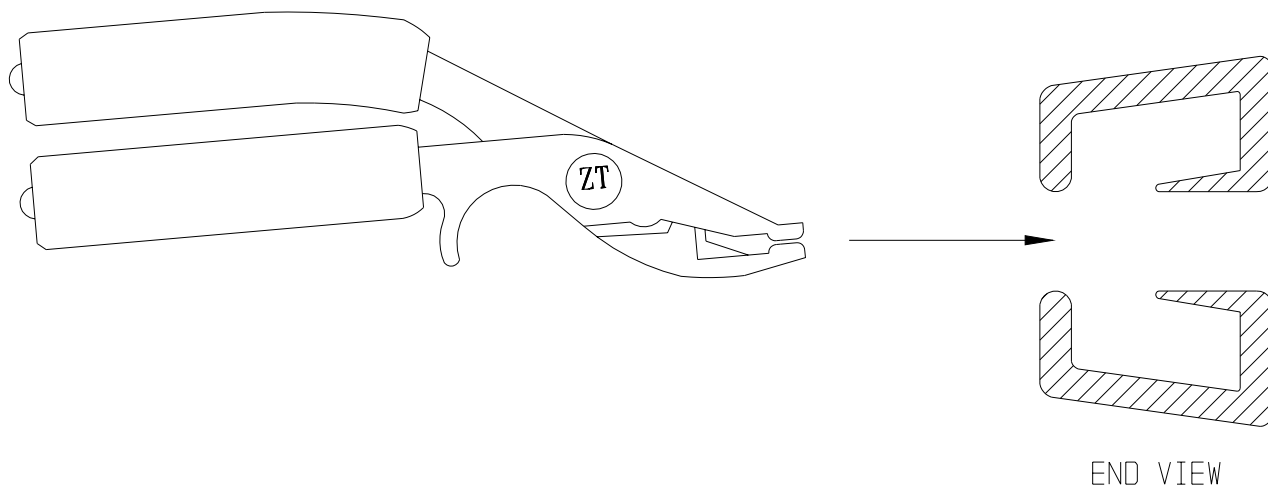
Z-TRACK JACKET (AS RECEIVED)



Z-TRACK JACKET (CLOSED)

ENGAGED Z-TRACK HALVES

FIGURE 1. Z-TRACK ZIPPERTUBING



END VIEW

FIGURE 2. ZTZ-SP PLIER TOOL

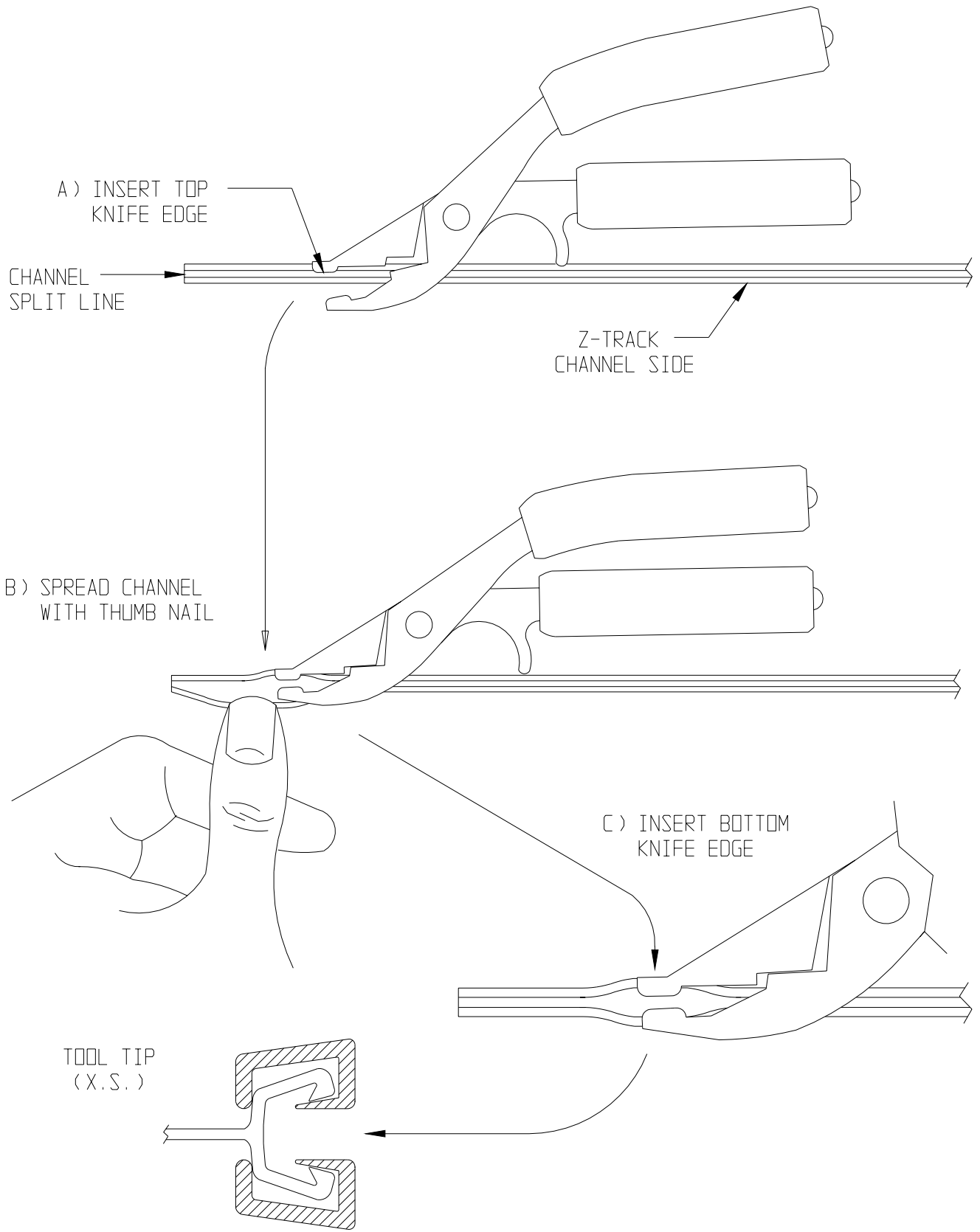


FIGURE 3. TOOL INSTALLATION ON TRACK

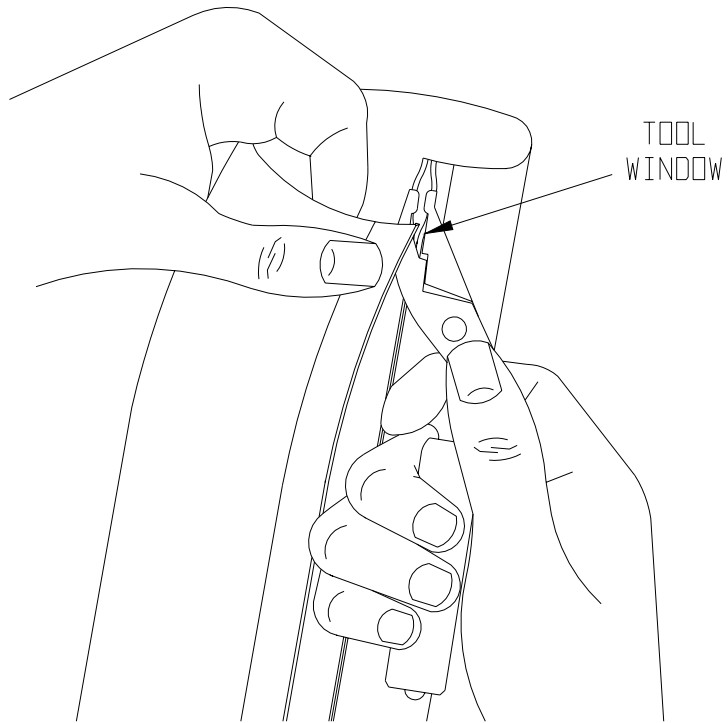


FIGURE 4. INSERTING ARROW

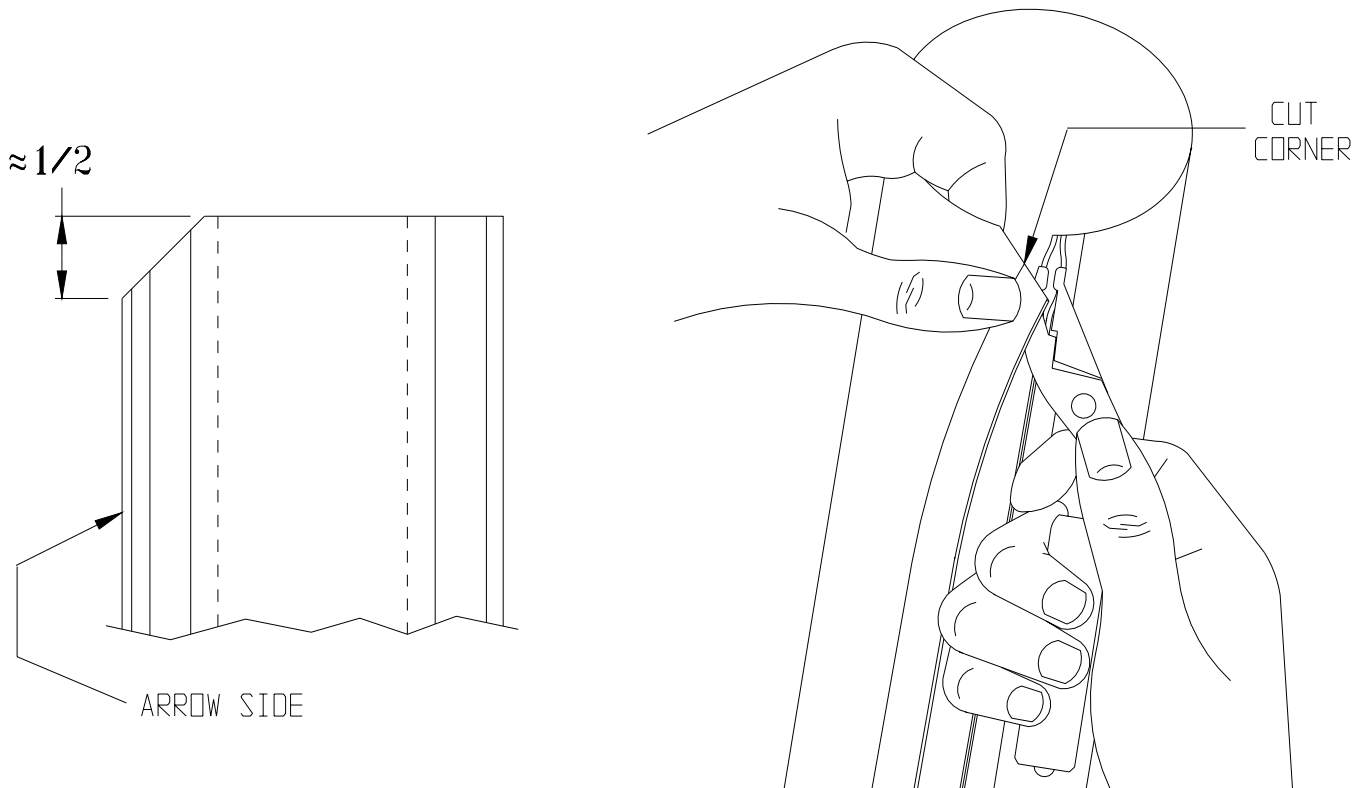


FIGURE 5. OPTIONAL CORNER TRIM

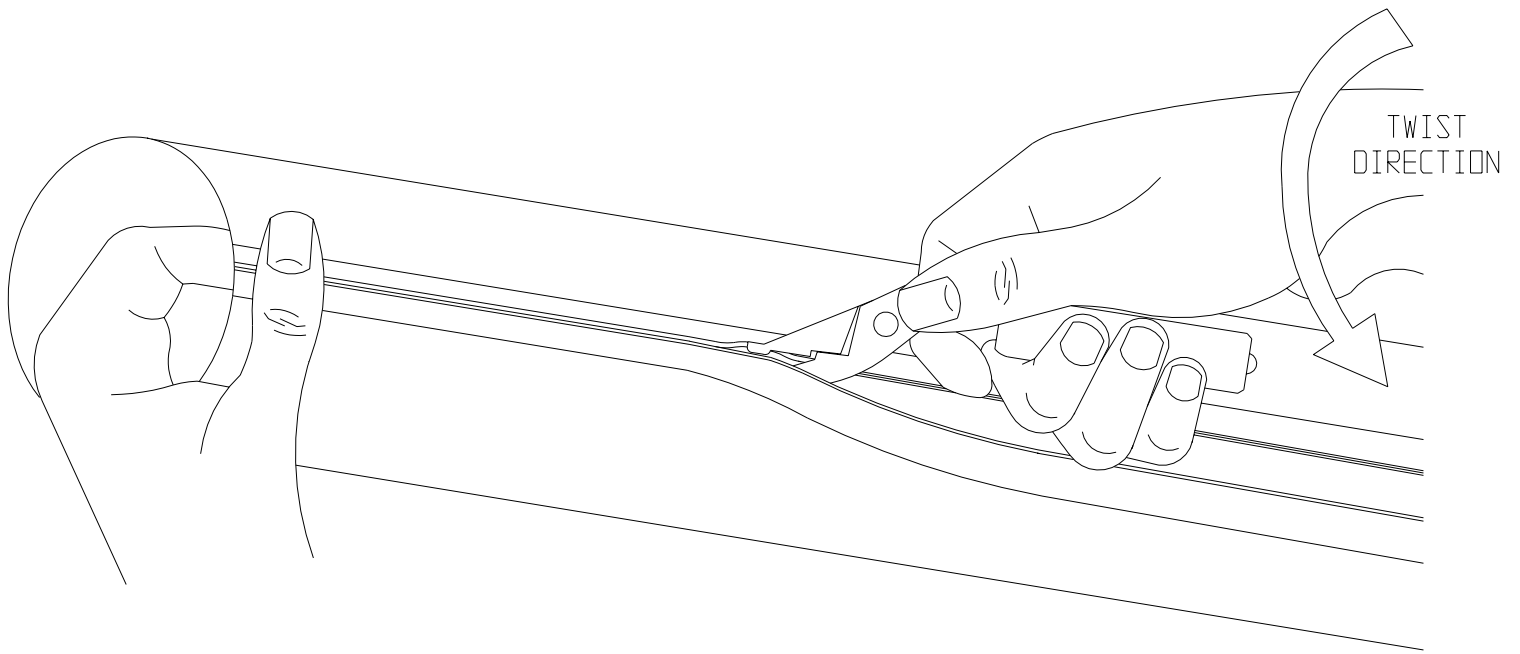
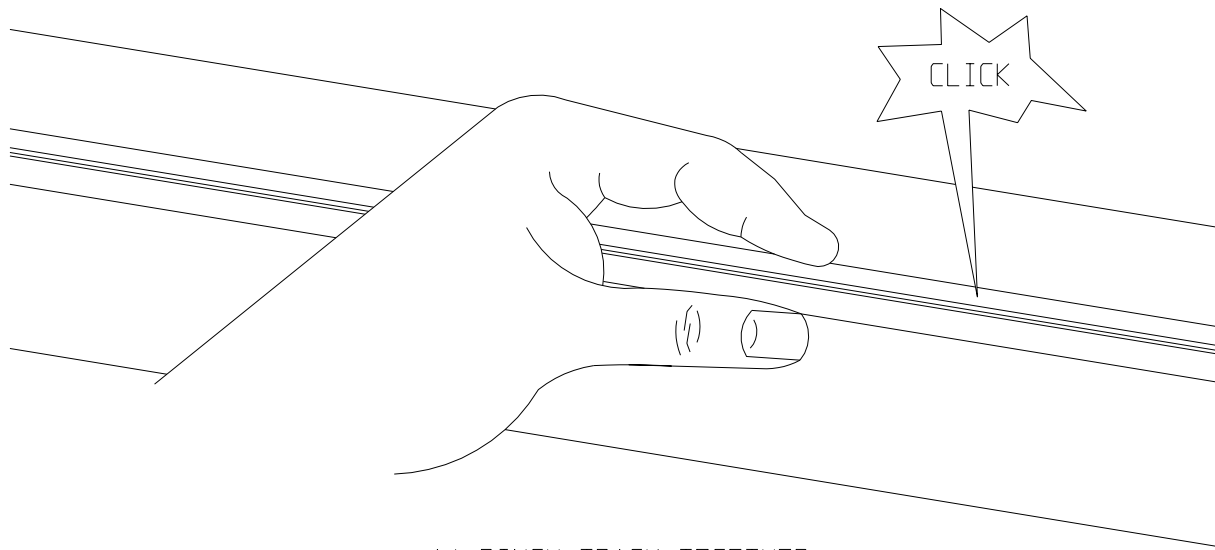
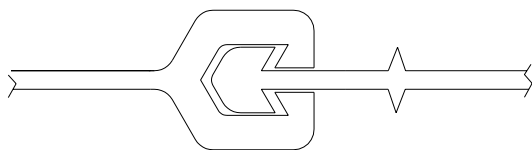


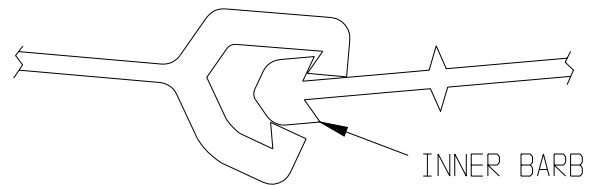
FIGURE 6. CLOSING JACKET



A) PINCH TRACK TOGETHER



B) CORRECT CONDITION



C) INCORRECT CONDITION

FIGURE 7. INSURING FULL CLOSURE

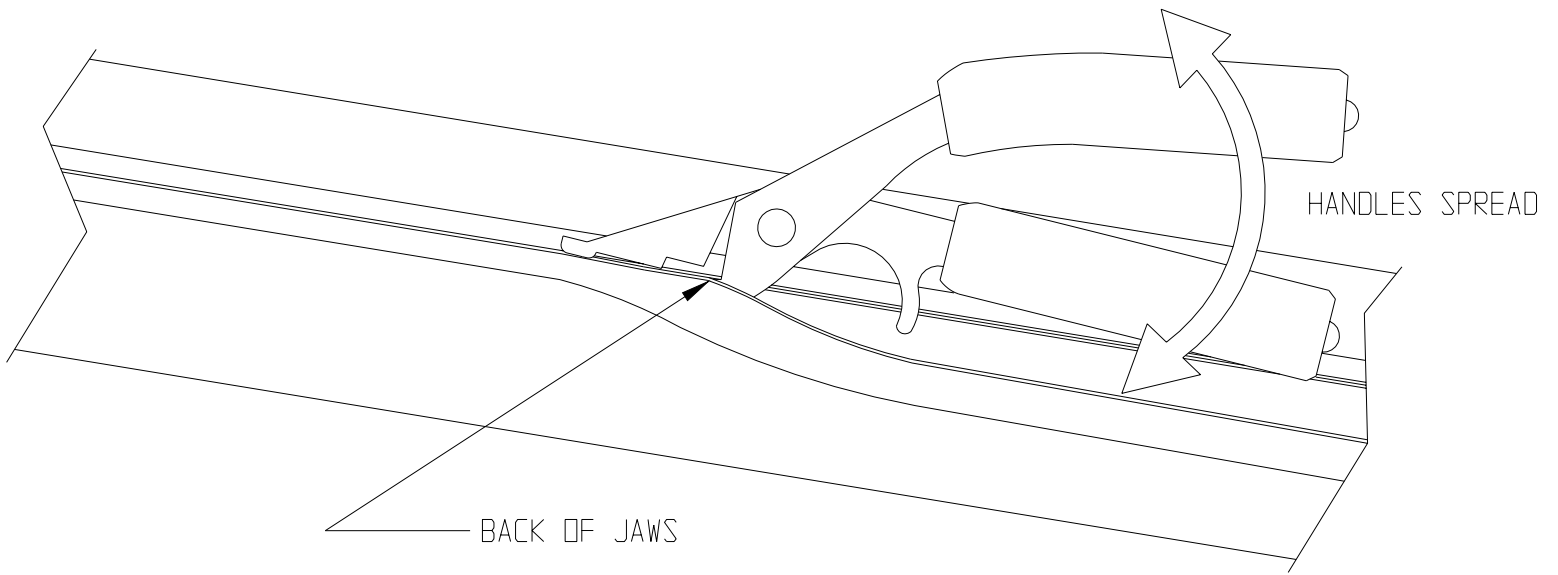


FIGURE 8. RE-INSTALL TOOL

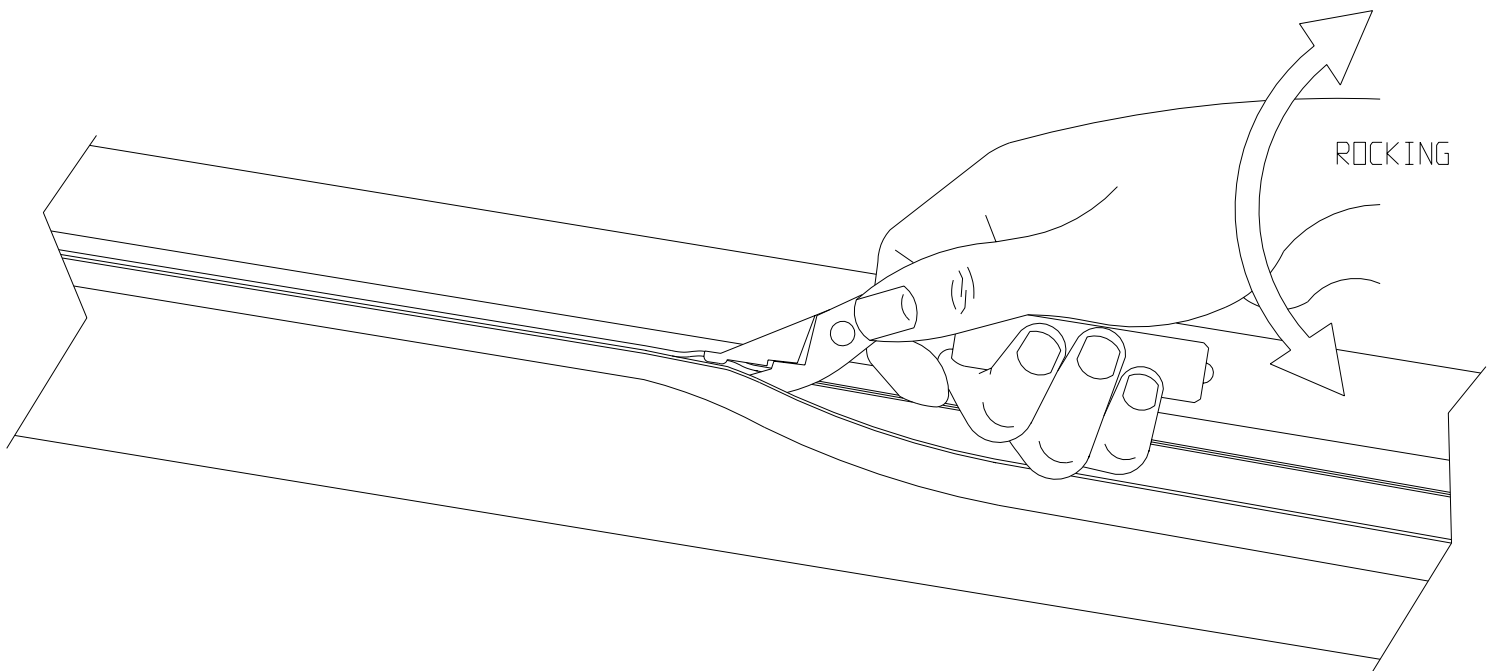
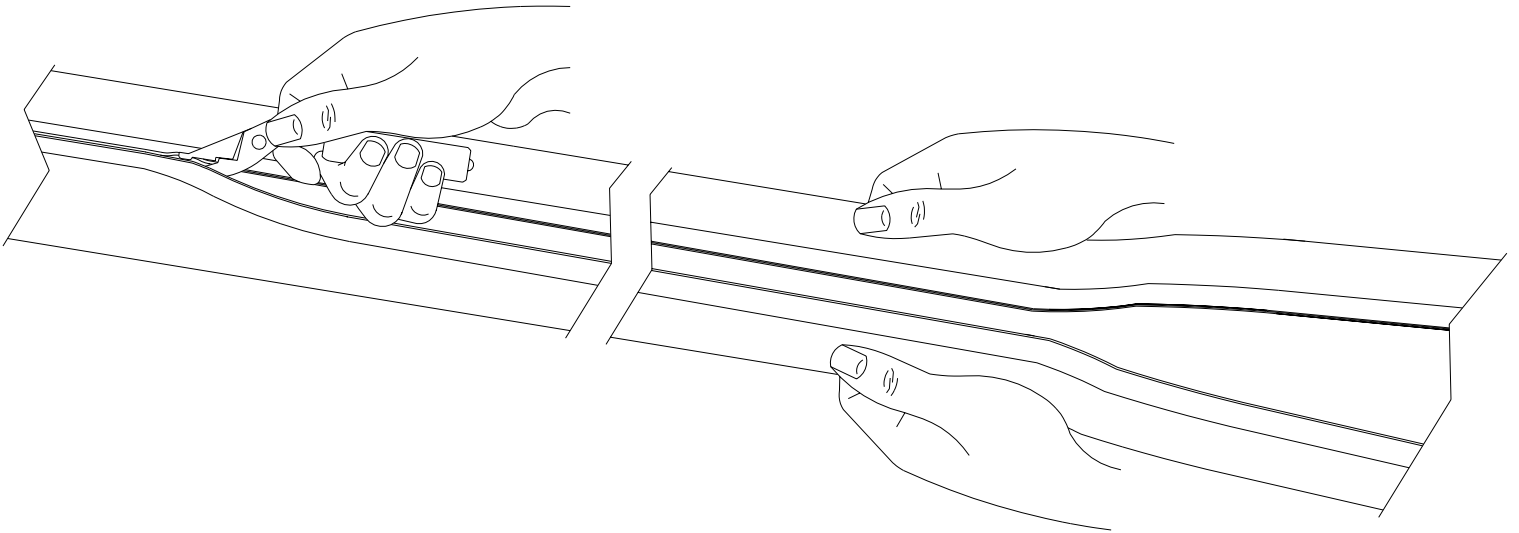
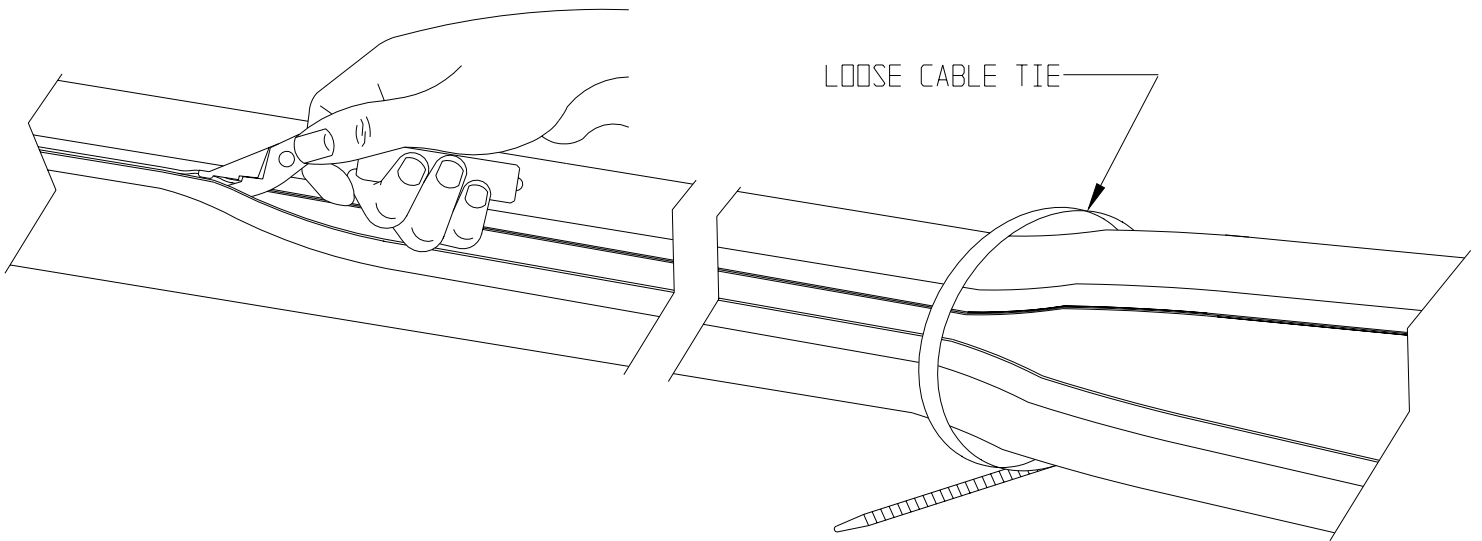


FIGURE 9. RE-ENGAGING TOOL



a) HELPER PRE-FORMING JACKET



b) CABLE TIE PRE-FORMING JACKET

FIGURE 10. PRE-SHAPING JACKET

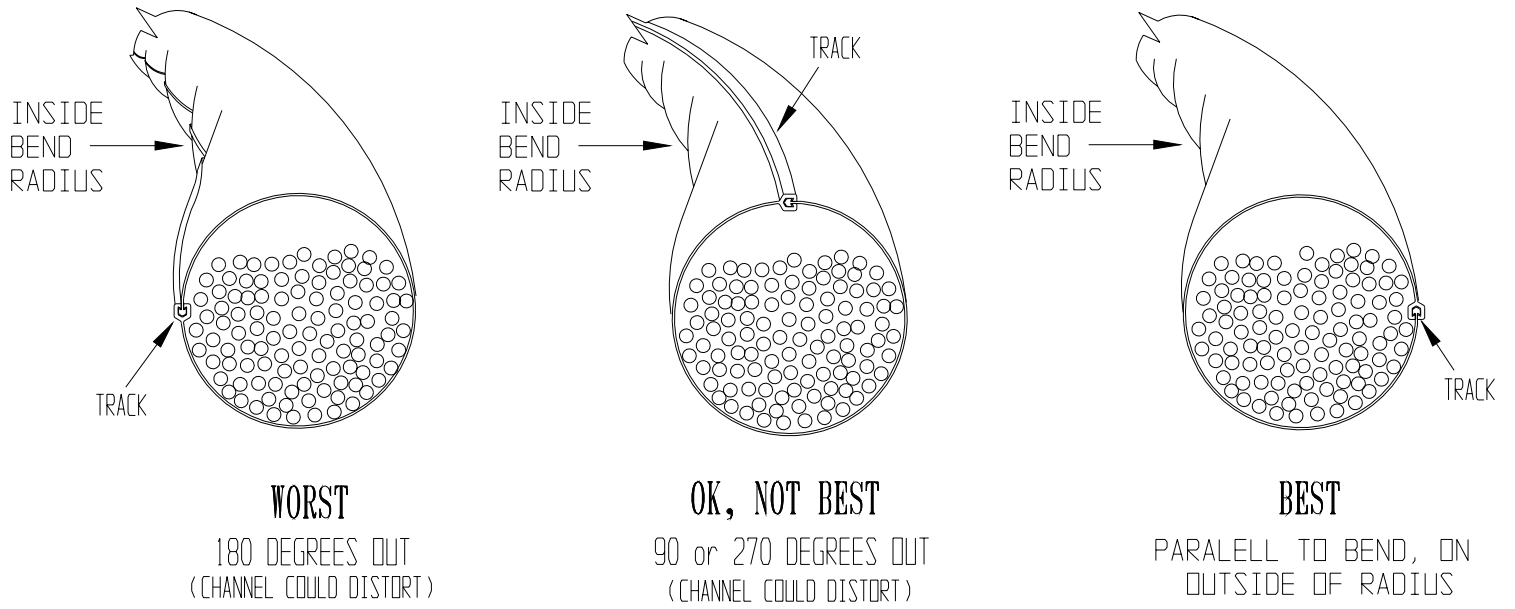


FIGURE 11. TRACK POSITIONING

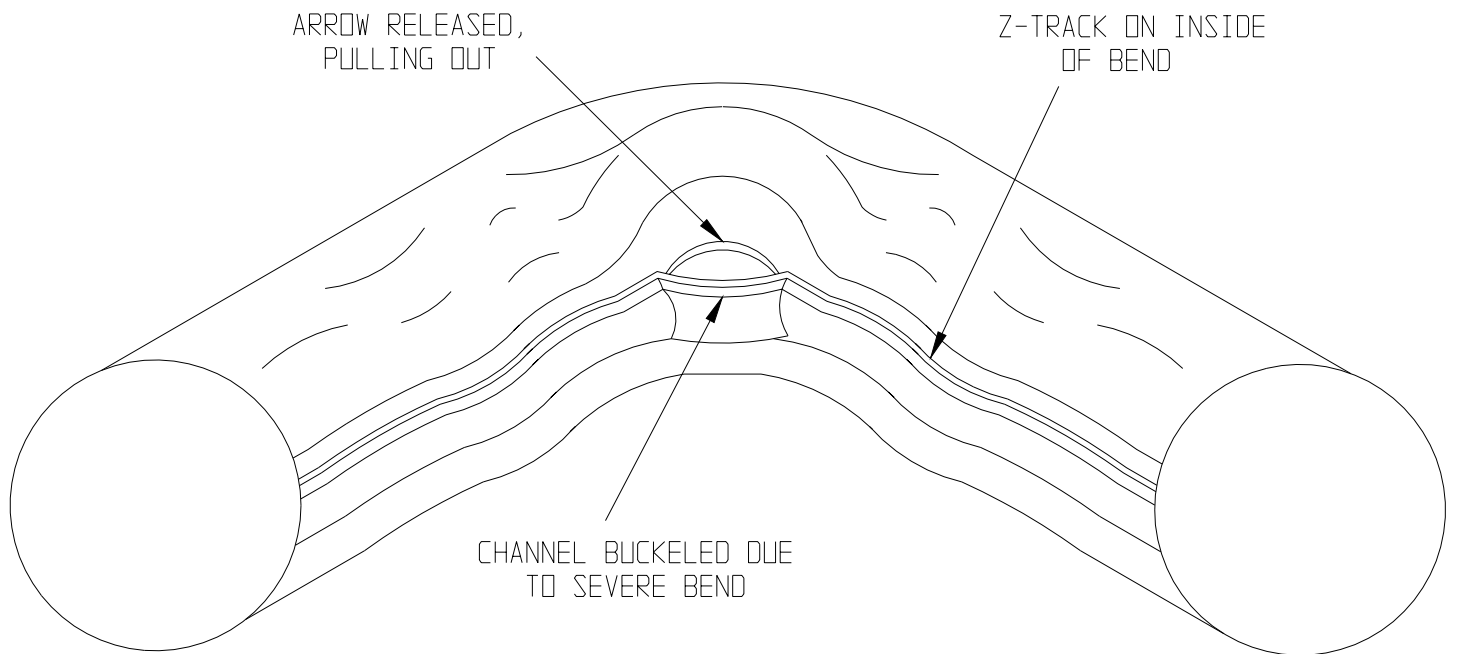


FIGURE 12. TRACK DISTORTION